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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/079,468	02/19/2002	Christopher M. Fender	399483	6678

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EXAMINER	
WHALEY, PABLO S	
ART UNIT	PAPER NUMBER
1631	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/079,468	FENDER ET AL.	
	Examiner	Art Unit	
	PABLO WHALEY	1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 May 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 8-34* is/are pending in the application.

4a) Of the above claim(s) *14-19 and 21-34* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,8-13 and 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05/06/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims Under Examination

Claims 1-4 and 8-20 are pending. Claims 5-7 have been cancelled. Claims 14-19 and 21-34 are again withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Priority

This application has been granted the benefit of priority to US Provisional Application 60/269,474, filed 02/16/2001.

Information Disclosure Statement

The information disclosure statement filed 05/06/2008 has been considered in full.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-4, 8-13, and 20 are rejected under 35 U.S.C. 101 because these claims are drawn to non-statutory subject matter.

This rejection is newly applied to claim 20.

Claims 1-4 and 8-13 are drawn to methods. For a process to be statutory, it must provide: (1) a practical application that must result in a physical transformation (i.e. reduction of an article to a different state or thing), or (2) a practical application that produces a concrete, tangible, and useful result [State Street Bank & Trust Co. v. Signature Financial Group Inc. CAFC 47 USPQ2d 1596 (1998)], [AT&T Corp. v. Excel Communications Inc. (CAFC 50 USPQ2d 1447 (1999)]. As noted in State Street Bank & Trust Co. v. Signature Financial Group Inc. CAFC 47 USPQ2d 1596 (1998), the statutory category of the claimed subject matter is not relevant to a determination of whether the claimed subject matter produces a useful, concrete, and tangible result. The question of whether a claim encompasses statutory subject matter should not focus on which of the four categories of subject matter a claim is directed to (i.e. a process, machine, manufacture, or composition of matter) but rather on the essential characteristics of the subject matter, in particular, its practical utility.

In the instant case, claims 1-4 and 8-11 result in predicting the soybean cyst nematode resistance. Similarly, claims 12-13 result in obtaining a prediction of the soybean cyst nematode resistance. As claims 1-4 and 8-11 and 12-13 both result in non-physical method steps that may be practiced inside of a computer (i.e. *in-silico*), they do not result in a physical transformation of matter. Where a claimed method does not result in a physical transformation of matter, it may be statutory where it recites a result that is concrete (i.e. reproducible), tangible (i.e. communicated to a user), and useful result (i.e. a specific and substantial). However, while "predicting" a result and "obtaining" a result provides concrete and useful results, these are not tangible results because said predicting and obtaining does not communicate a result to a user in a user readable format. Therefore the claimed methods do not recite a practical application of a 35 U.S.C. 101 Judicial exception and are not statutory.

This rejection could be overcome by amendment of the claims to recite that a result of the process is outputted to a user in a user readable format, outputted to a display, or by including a result that is a physical transformation.

By similar reasoning, claim 20 is drawn to machine readable code comprising machine readable instructions (i.e. a program) also lacks a tangible result. The claimed machine readable code results in obtaining a prediction. However, obtaining a prediction is not a tangible result because it is does not communicate a result in a form that is useful to the user of the process (i.e. a user readable format). Therefore the claimed machine readable code does not recite a practical application of a 35 U.S.C. 101 Judicial exception and is not statutory.

This rejection could be overcome by amendment of the claims to recite that a result of the process is outputted to a user in a user readable format, outputted to a display, or by including a result that is a physical transformation.

In addition, claim 20 is drawn to machine readable code comprising machine readable instructions (i.e. a program). A review of the specification does not show a definition of machine readable code such that it excludes an embodiment that is information in a signal. As such an embodiment of the claims read on non-statutory subject matter (In re Nuijten 84 USPQ2d 1495 (2007)). The applicants may overcome the rejection by amendment of the claims to be limited to physical forms of computer readable media described in the specification, or if no description exists for physical computer readable media, by presenting a statement that the claims do not read on embodiments that are not physical computer readable media that are conventional in the art. The applicants are cautioned against introduction of new matter in an amendment.

Response to Arguments

Applicant's arguments, filed 05/06/2008, that the claimed invention is statutory because it has not been determined that the claimed invention falls within one of the judicial exceptions (i.e. abstract idea, natural phenomenon, or law of nature) have been considered but are not persuasive. In response, claims 1-4 and 8-13 are directed to methods resulting in predicting resistance and obtaining a prediction, and therefore clearly fall within one of the four enumerated categories of patentable subject matter (i.e. a process). However, the question of whether a claim encompasses statutory subject matter should not focus on which of the four categories of subject matter a claim is directed to but rather on the essential characteristics of the subject matter, in particular, its practical utility. In the instant case, the claimed methods recite a combination obtaining spectroscopic scans (i.e. physical assay) and steps directed to comparing data using discriminant analysis, and predicting resistance (i.e. abstract ideas). The instant claims do not result in a practical application by physical transformation, as set forth above. Where a claimed method does not result in a physical transformation of matter, it may be statutory where it recites a result that is concrete (i.e. reproducible), tangible (i.e. communicated to a user), and useful result (i.e. a specific and substantial). However, while steps for "predicting" a result and "obtaining" a result both provide concrete and useful results, these are not tangible results because said predicting and obtaining does not communicate a result to a user in a user readable format. Therefore the claimed methods do not recite a practical application of a 35 U.S.C. 101 Judicial exception and are not statutory. This rejection is maintained.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-4, 8, 10-13, and 20 are rejected under 35 U.S.C. 103(a) as being obvious over Qiu et al. (Journal of Nematology, 1997, Vol. 29, No. 4, 523-530, in the IDS filed 4/7/2003), in view of Marek et al. (Crop Sci., 2000, Vol. 40, p. 713–716) and Rutherford (Journal of Chemical Ecology, 1998, Vol. 24, No. 9, p.1447-1463).

Qiu et al. (1997) teach methods for preparing soybean seed samples infected with nematodes (p.524, Col. 2). Nematode susceptible and nematode resistant samples are used for experimentation (Fig. 2). A colorimetric assay (p.525, Col. 1, para. 2) and (Fig. 1) is used to determine chitinase activity by measuring the absorbance of soybean root supernatant (i.e. soybean sample) spectrophotometrically at

550 nm. Qiu et al. (1997) determine that the chitinase enzyme is associated with nematode resistance and susceptibility in the soybean (Abstract). Qiu et al. (1997) also show a relationship between organic soybean material (oil and protein), polygenic traits, and SCN resistance [p.357, Col. ¶ 3] and [Table 1].

Qiu et al. (1997) do not specifically teach the use of obtaining a spectroscopic scan to provide assay spectra over a predetermined frequency range comprising near-infrared, as in claims 1, 10, 11, 12, and 20.

Qiu et al. (1997) do not specifically teach predicting SCN resistance based on comparing assay spectra and a predictive model, as in claims 1 and 12.

Marek et al. teach use of near-infrared spectroscopy (NIRS) for measuring chitinase activity (Abstract and p. 714, Methods and Materials, Col. 1) to determine disease resistance in tall fescue seedlings (Abstract).

Rutherford teaches a method for predicting the resistance of sugarcane to *E. saccharina* [Abstract] based on NIR spectroscopic scans of sugarcane samples are obtained over a predetermined frequency range (p. 1449, Near Infrared). Spectral data is analyzed using multiple linear regression analysis with a small number of selected wavelengths (p.1450, ¶3 and ¶4) and the SELECT spectral algorithm is used to construct calibration and validation sets for the predictive and (p.1451, Results) and determine detectable chemical differences indicative of resistance or susceptibility (p.1452, ¶3). The model allows for discrimination based on several difference chemical characteristics including protein (Table 1). The calibration sets are used to predict resistance and susceptibility by comparing differences in absorbance profiles (p.1454).

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to use the soybeans samples and nematode-resistance marker taught by Qiu et al. (1997) in combination with the NIRS spectral assay and predictive model taught by Marek et al. and Rutherford, since chitinase is a known marker for determining soybean resistance to nematodes, as shown by Qiu et

al. (1997), and since NIR spectroscopy is a known technique for detecting chitinase activity in seedling samples, as shown by Marek et al. One of ordinary skill in the art would have been motivated to combine the above teachings in order to improve the prediction of nematode-resistant soybeans since NIR spectroscopy is a rapid and low-cost for predicting resistance, as shown by Rutherford (p.1448, ¶5).

Claims 1, 8, and 9 are rejected under 35 U.S.C. 103(a) as being obvious over Qiu et al. (Journal of Nematology, 1997, Vol. 29, No. 4, 523-530, in the IDS filed 4/7/2003), in view of Marek et al. (Crop Sci., 2000, Vol. 40, p. 713–716) and Rutherford (Journal of Chemical Ecology, 1998, Vol. 24, No. 9, p.1447-1463), as applied to claims 1-4, 8, 10-13, and 20 above, and in further view of Borggaard et al. (Anal. Chem. 1992, 64:545-551).

Qiu et al. (1997), Marek et al., and Rutherford make obvious a method for predicting the soybean cyst nematode resistance of a soybean sample, as set forth above.

Qiu et al. (1997), Marek et al., and Rutherford do not specifically teach natural intelligent algorithms as recited in claim 9. However, Rutherford and Qiu et al. clearly teach multivariate predictive algorithms and discriminatory analysis models, as set forth above.

Borggaard et al. teach the use of neural networks for optimally interpreting NIR spectra for classifying samples [Abstract and p. 546, Section I], as in claim 9. More specifically, said neural networks are used to compare results and predict fat in homogenized meat products using NIR spectral data [Table II] and [Fig. 6].

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to modify the predictive model made obvious by Qiu et al. (1997), Marek et al., and Rutherford using a neural network model as taught by Borggaard et al., since the use of intelligent algorithms for

spectral classification is well known, as shown by Borggaard above. One of ordinary skill in the art would have been motivated to use a network for training and analysis of soybean NIR spectral data since Borggaard (p.550, Section VIII) shows this improves the predictive power of the model by reducing spectral noise.

Response to Arguments

Rejection under 35 U.S.C. 103(a) over Qiu in view of Marek and Rutherford

Applicant's arguments, filed 05/06/2008, have been fully considered but are not persuasive.

In response to applicant's arguments that the claimed invention solves the problem unsolved by others [p.10, ¶3], applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

In response to applicant's argument that the cited references do not teach predicting SCN resistance, Rutherford teaches a method for predicting the resistance and susceptibility of sugarcane to *E. saccharina* [Abstract] by comparing differences in absorbance profiles based on NIR spectroscopic scans of sugarcane samples (p. 1449, Near Infrared, and p.1454). Spectral data is analyzed using a discriminant model (Table 1, p.1450, ¶3 and ¶4, p.1451, Results).

In response to applicant's argument that Qiu only examines root activity, Qiu teaches methods for preparing soybean seed samples infected with nematodes (p.524, Col. 2). Marek teaches the use of near-infrared spectroscopy (NIRS) for measuring chitinase activity (Abstract and p. 714, Methods and Materials, Col. 1) to determine disease resistance in tall fescue seedlings (Abstract). Therefore, it would have been obvious to one of ordinary skill in the art to examine soybean seedlings.

In response to applicant's argument that even if Qiu discloses root and shoot samples may be used to predict susceptibility of a soybean plant to root-knot nematode, it would not have been obvious to predict susceptibility of a soybean plant to SCN, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to someone of ordinary skill in the art at the time of the instant invention to use the soybeans samples and nematode-resistance marker taught by Qiu et al. (1997) in combination with the NIRS spectral assay and predictive model taught by Marek et al. and Rutherford, since chitinase is a known marker for determining soybean resistance to nematodes, as shown by Qiu et al. (1997), and since NIR spectroscopy is a known technique for detecting chitinase activity in seedling samples, as shown by Marek et al. One of ordinary skill in the art would have been motivated to combine the above teachings in order to improve the prediction of nematode-resistant soybeans using a rapid and low-cost for spectroscopic technique for predicting resistance, as shown by Rutherford (p.1448, ¶5). This rejection is maintained.

Rejection under 35 U.S.C. 103(a) over Qiu in view of Marek, Rutherford, and Borggaard

Applicant's arguments, filed 05/06/2008, are reiterated from the arguments as set forth above with regards to Rutherford in view of Qiu, Marek, and Rutherford. Therefore, applicant's arguments have been fully considered and are not persuasive for the reasons set forth above. This rejection is maintained.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pablo Whaley whose telephone number is (571)272-4425. The examiner can normally be reached on 9:30am - 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marjorie Moran can be reached at 571-272-0720. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Pablo S. Whaley/

Patent Examiner

Art Unit 1631

/John S. Brusca/
Primary Examiner, Art Unit 1631